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ABSTRACT

While the desirability of small classes seems an article of faith among educators, a review of the research indicates that class size in itself has rarely shown a substantial effect on educational achievement. The research itself has been flawed by the impossibility of determining or measuring all the variables that changes in class size can affect. It may also be true that the positive effects attributed to smaller classes are not translatable into testable outcomes. In the end, educational goals, instructional strategies, and related contextual matters may be most important in determining optimum class size. Smaller classes require greater staffing, which could help satisfy teacher associations in a time of declining enrollment, but they also raise costs. A weighting system that favors students needing extra attention may be one way of making class size policies flexible. (Author/PGD)

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Series 1, No. 12

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CLASS SIZE

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FOREWORD

Both the Association of California School Administrators and the ERIC Clearinghouse on Educational Management are pleased to cooperate in producing the *School Management Digest*, a series of reports designed to offer educational leaders essential information on a wide range of critical concerns in education.

At a time when decisions in education must be made on the basis of increasingly complex information, the *Digest* provides school administrators with concise, readable analyses of the most important trends in schools today, as well as points up the practical implications of major research findings.

By special cooperative arrangement, the series draws on the extensive research facilities and expertise of the ERIC Clearinghouse on Educational Management. The titles in the series were planned and developed cooperatively by both organizations. Utilizing the resources of the ERIC network, the Clearinghouse is responsible for researching the topics and preparing the copy for publication by ACSA.

The author of this report, Sydney Thompson, was commissioned by the Clearinghouse as a research analyst and writer.

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A PROBLEM OF BELIEF AND KNOWLEDGE

The question of what class size brings the best education might seem at first to be a simple one with a clear answer. Most people, both educators and the public, assume that smaller classes make for better classroom experience and greater learning. Gallup reports that over 80 percent of educators and public school parents believe that small classes make "a great deal of difference" in "the achievement or progress of students." Seemingly, all discussions of school quality accept smaller classes or lower pupil-staff ratios as a condition of quality.

McKenna and Olson typify this common belief in smaller classes. "For a great range of important educational goals and processes," they argue, "fewer is unquestionably better than more." Fewer students per class promote a greater variety and more effective use of learning activities and more individualized instruction. In smaller classes, students engage in more creative and divergent thinking, develop more positive social behaviors, and show greater interpersonal regard. Classroom management problems are minimized. The attitudes of both students and teachers are more positive. And students learn both basic skills and subject content better.

Teachers' support for smaller classes is particularly strong. Teachers find large classes, as Fleming indicates, "a reason for failure in basic subjects," "exhausting," and "a cause of frustration." A recent National Education Association survey, "Teacher Opinion Poll: Class Size," reports that 80 percent of teachers consider small classes extremely important for student achievement and that 64 percent consider them as important for students' social and personal development. Another 74 percent consider them extremely important for job satisfaction.

The complaint of John W. Payne, a high school science teacher, given in "Four Teachers Sound Off about Class Size,"

illustrates teachers' belief in smaller classes and frustration with large classes. Large classes and a large workload, Payne argues, prevent him from teaching effectively, particularly by limiting his ability to respond to individual needs. The students suffer as a consequence.

"It is impossible for me," he writes, "to get to all my students each class period. And because some of the students have pressing needs, the less demanding students may have no contact with me for two or three days. Forced to decide which students will get my attention, I invariably neglect some students when just a word of encouragement might make all the difference." He similarly lacks the time to evaluate his students well: "We are forced to give fewer tests, or ones that are less meaningful. We all know who is being cheated." In sum, the problem of class size presents but two choices: "The only alternative to having fewer students is to lower your goals—and many teachers have done this."

But this strong belief in the value, even necessity, of smaller classes receives only limited support from the research on class size. The more than 300 studies, which date from the turn of the century, question this belief with mixed and often contradictory results. The studies of the effect of class size on achievement seem to show that size makes no difference, for many of these studies find larger classes as effective as smaller ones. Studies of the effect of class size on educational process, much fewer in number, offer somewhat more positive findings. The majority favor smaller classes, but seldom very strongly.

This vast research requires interpretation, as Acland emphasizes, and its mixed results invite divergent and sometimes partisan judgments. McKenna and Olson use some sixty works to justify their claims for smaller classes. Murphy uses the full range of the research to reduce such claims to mere contentions. Most reviewers of the research judge the evidence to be inconclusive and remain skeptical that class size has much impact. Some take pains to explain away the apparent contradiction between the common belief and the research results.

The problem of judgment is complicated by the problems of the research itself. The varied focus of the many studies

frustrates attempts at synthesis. The generally poor quality of the studies also undermines their findings. Just a few class size studies, as Murphy notes, can be trusted. And the new studies that continue to appear seldom avoid the failings of past studies. The research will not likely bring certainty soon.

And as long as the evidence remains doubtful, the debate over class size will be a volatile one for practitioners, for it has major economic implications and must be carried out in a charged political atmosphere. Teacher unions will continue to push for smaller classes. Administrators, while they may find smaller classes desirable, must balance their presumed benefits against often pressing economic demands. Smaller classes require more classrooms and more teachers and can be very expensive when staff salaries compose some 80 percent of the budget.

This digest will review the class size literature as an aid in clarifying the issues and sorting out the seeming contradiction between belief and evidence. It will first examine the problems of the research, next review selected studies on process and achievement, and then present some of the pertinent inferences and speculations about class size. This discussion will provide a ground for a more practical look at the issues of class size policy.

PROBLEMS OF THE RESEARCH

Although abundant, the research on class size has failed to bring clear answers or a true consensus. The present confusion over the meaning of class size stems in part from the problematic nature of the research itself. For this reason a critique of the research and its limitations must precede a look at its findings.

All reviewers complain of the poor quality of the research. For Ryan and Greenfield, the research is "conceptually and methodologically" suspect; it "grossly oversimplifies" the complex issue raised by the question, "How many children should be in a classroom if they are to learn effectively?" It also uses "analytical tools inadequate to the task." It is fraught with problems of definition and measurement and fails to recognize and control the many variables that influence the teaching-learning process.

Problems of Definition and Measurement

Variations in definition can make comparisons of different studies very difficult. The many studies vary greatly in their use of "small" and "large," which necessarily are relative terms. Most studies have chosen to compare only two size ranges, typically setting the smaller size at under twenty-five students and the larger at thirty and above. At the extremes, smaller classes can be less than ten and larger classes over one hundred. The worst confusion arises when the small class of one study becomes the large class of another. Some researchers have defined "small" as high as forty students and others "large" as low as twenty-two.

The concept of "class size" also receives different uses. Most educators would define "class" and "class size" in terms of the traditional self-contained classroom of one teacher. But the more recent use of team teaching and aides challenges this definition; some studies compare single-teacher classes

against multiple-teacher classes. The issue is complicated further by the impact of support staff on classroom instruction. Vincent (1969) argues that class size be broadly defined in terms of the relative amount of professional instructional service made available to students.

Varied and inexact measures also contribute to the problems of the research. The use of such variables as class size, teacher load, and pupil-staff ratio—each of which measures something different—prevents easy generalizations. And the use of averages in general masks subtleties in the variables examined. Such measures as "average class size," "percent of classes with less than 22 pupils," and "percent of classes with more than 27 pupils," employed by Woodson to study class size across districts, provide approximations at best.

The outcome measures used by the research also limit its precision. Its reliance on standardized achievement tests to measure learning is frequently questioned by educators. Erickson, for example, argues that normed achievement tests "are inappropriate for determining the effects of class size" because they are "devised to accentuate individual differences and deemphasize differences associated with programs." The coverage of achievement tests, he adds, may not always match the specific content of the curriculum examined. And such tests are also limited to measuring only one kind of learning among many that are desired.

Measures of educational process present problems as well. They lack the objectivity of achievement tests, since they use predetermined concepts of quality, which change from study to study, and depend on observations of the classroom, often employing many different observers. And the process studies make no attempt to link process to achievement outcomes.

Matters of Context

A more basic problem with the research is its failure to consider class size in context. Class size operates as only one of many variables that together determine the quality of educational process and learning. The research does not adequately control or distinguish the effects of these other varia-

bles, which can be more powerful than class size and confound its true impact. The findings consequently remain uncertain. On the basis of their survey of the research, Ryan and Greenfield conclude, "It would be quite safe to say that in no existing study of class size have all the contributing effects been examined or controlled."

The most important factors due consideration are teaching method and teacher behavior. As Vincent (1969) argues, "Any criterion employed to assess the effect of class size is in actuality assessing the accomplishments of some method—the method of teaching which was used in the study in question." The studies of process pay close attention to method and teacher-student interaction, but the studies of achievement employ poor or no controls. Class size studies also avoid considerations of teacher quality; as Vincent notes, they "appear to adopt the mythical view that all teachers are equivalent." When studies try to control for teacher quality, they usually must rely on inadequate proxy variables such as teacher education and experience.

Also important, and usually ignored, is teacher workload. Laughlin suggests that, at the college level at least, workload may have a greater impact on teachers and student learning than class size. The real problem, he states, may be not the number of students in one class, but the total number of students that one instructor faces.

The research also fails to give adequate attention to many other factors. Among them are such internal classroom variables as subject matter, student ability and attitude, staffing arrangement, and such external factors as the school's organizational structure and support services.

Blake's Review of the Research

The problems of the research on class size—both its poor quality and its mixed findings—are well evidenced by Blake, whose comprehensive 1954 critique of the literature has become a standard work. In an attempt to sort out the reliable from the unreliable studies on class size, Blake examined 267 works and initially eliminated from consideration all works

that did not employ basic research procedures. Eighty-five studies survived. Of them, thirty-five favored smaller classes, eighteen favored larger classes, and thirty-two found no significant difference.

Blake then examined these studies further to check for research adequacy and reduced his list to only twenty-two studies. Eleven of these considered student achievement. Five favored smaller classes, three larger, and three found no difference. The other studies favored smaller classes on the basis of criteria other than achievement. Eight measured teacher and administrator opinion. Two examined the quality of classroom activities and teacher practices, and one examined teacher knowledge of students.

Subsequent reviews have used and misused Blake in support of smaller class size. Standard statements, drawn from both of Blake's tallies, have been that the research favors smaller classes at a two-to-one ratio, or at sixteen studies to six. But such judgments cloud the evidence, as Murphy and other educators point out, for the studies that found no significant difference cannot be ignored, and the opinion studies do not carry much weight.

For some reviewers, Blake may have been too generous in his analysis. Lindbloom states that the research failings criticized by Blake, which include the failure to control for teaching method, the short-term nature of the studies, and their use of atypical situations, apply as well to the studies he accepted. Holland and Galfo note that Blake accepted studies employing questionable statistical methods.

Whether overly generous or not, Blake's critique and conclusions remain representative of the research and its problems. Subsequent studies have brought a similar pattern of results and have suffered from similar problems of quality. With this cautionary look at the state of the research, we can proceed to the research evidence itself.

CLASS SIZE AND EDUCATIONAL PROCESS

Smaller class size appears to contribute to quality educational process. As Lindbloom indicates, most of the research on process supports the commonsense belief that smaller classes bring more desirable classroom practices and social interaction. But some reviewers, notably Murphy and Ryan and Greenfield, remain doubtful. Some studies find no significant relationship between class size and process. And most of the studies favoring smaller classes come from one institution, which may be a cause for skepticism.

A brief review of selected studies and findings will justify this cautious conclusion in favor of smaller class size. In one study, McKenna and Pugh used observations of 180 classes to compare the extent of individualization in small (twenty or less students) and large (thirty or more) classes. They found that teachers in the smaller classes provided a greater number and variety of learning activities and, most importantly, a greater percentage of individualized and small group activities, the actual percentages being 41 percent for the smaller classes and 23 percent for the larger. The benefits of the smaller size were present for all grade levels, but greatest at the K-3 level.

The authors also surprisingly found that teachers of smaller classes still relied heavily on mass-oriented instruction, though significantly less so than the larger class teachers. They concluded that while smaller classes can best serve individual differences, they "do not automatically bring a change in the teacher's methods of dealing with pupils." "Schools must seek," they added, "to provide special help for those teachers who have the opportunity to work with small classes."

Richman, as Ryan and Greenfield report, studied the effects of changes in class size on teacher practices. His sample included thirty-six teachers of middle elementary grades in six school systems that had deliberately reduced or increased class size. Based on observations and interviews, he found, as

Ross and McKenna write, that reductions in class size brought an increasing use of desirable practices attentive to individual needs and that increases in size depressed the use of these practices.

Richman also found that administrative action influenced the teachers' response to size changes. Teachers informed of size reductions and given supervisory help showed a quicker and more pronounced adjustment of practices. And teachers receiving similar notice and help in the face of size increases better maintained their use of desirable practices. He also concluded that teachers could require as much as three years to adjust their practices to smaller classes.

The most discussed process study is Olson's Indicators of Quality study (1970, 1971). Olson used 18,528 classroom observations to relate eleven internal classroom variables to a quality criterion, designed to measure "individualization, interpersonal regard, group activity, and creativity." The study examined class size under ten size ranges of from under five to over fifty.

Olson found that seven of the variables were strong predictors of quality scores. In order of decreasing importance, these were style of educational activity, subject taught, class size, grade level, type of teacher (whether regular, substitute, student, or aide), number of adults in the classroom, and day of the week. He judged smaller class size to be consistently related to higher quality, though most strongly at the elementary level.

Olson's findings give some support to the idea of most desirable, if not optimal, class sizes. Although the relationship between class size and quality was essentially linear, with quality declining as size rose, major drops in quality scores occurred between certain class sizes. At the elementary level, these breakpoints came between classes of under 5 and 5-10, classes of 11-15 and 16-20, and classes of 21-25 and 26-30. At the secondary level, they came between classes of 5-10 and 11-15 and classes of 11-15 and 16-20. Olson concluded that small reductions in size would make little difference unless they brought size down below one of the breakpoints,

down, say, to twenty-five at the elementary level or fifteen at the secondary level.

But frequent criticisms of Olson's methodology and conclusions undermine or at least qualify its support for smaller classes. McCluskey and Smith, among the critics, warn that his study's data do not indicate that class size by itself governs quality. The style of educational activity, they argue, appears to be the determining factor. Some activities, such as discussion, consistently receive higher quality scores than others, such as lecture, irrespective of class size.

The explanation still remains, nonetheless, that class size influences quality by encouraging more learning activities in which students actively participate. Olson (1971) himself recognizes that size is only one of many contributing variables and makes no claim for a single right class size. "Administrators and teachers," he writes "should place major emphasis on *varying* class sizes to fit the unique needs of particular subjects with a careful view toward realistic, well-defined purposes for the various styles of educational activity."

Two paired studies by Walberg and Anderson and Walberg examined the influence of class size on classroom social environment. These studies deserve special attention for their sophisticated theoretical framework, if not for the strength of their conclusions. Walberg first studied the class size-social environment relationship in 149 secondary physics classes. Three years later he and Anderson sought to replicate his findings in a study of sixty-one secondary classes in seven subject areas. Both studies used the Learning Environment Inventory to measure social climate through students' perceptions, and both examined classes ranging in size from six to forty-one students in nine size increments.

The authors tested suggestive hypotheses drawn from group dynamics theory. Larger class size, they believed, would increase the needs for discipline and coordination and thus encourage more authoritarian and impersonal teacher behavior. Students could be expected to find larger classes "more formal and goal directed with more apathy and friction and less disorganization, cohesiveness, and satisfaction." Larger

size would also increase group resources and the need for individual communication and thus encourage students to adopt specialized roles and form subgroups or cliques. The classroom climate would then likely be one of greater "diversity," " 'cliqueness', favoritism, apathy, and friction, and less democracy, and less perceived difficulty," the latter "due to the use of increased group resources to hide and protect the laggards."

Their results only partially confirm their twelve hypotheses. Walberg found ten hypotheses supported, but only six with significant correlations. Considering only these six, larger classes were perceived to be more formal and goal directed, with greater diversity and less difficulty, disorganization, and cohesiveness.

Anderson and Walberg supported eight of Walberg's findings, but only two significantly. Larger size, they found, was marked by less difficulty and cohesiveness. They concluded that while other factors besides class size may have interfered with their results, their two replications establish a strong relationship between smaller size and perceived difficulty and cohesiveness.

Another study of classroom environment offers stronger conclusions. In a 1955 study, Cannon compared the classroom environment of two kindergarten classes, one ranging in size from twenty-three to twenty-eight children, the other ranging from thirty-four to thirty-nine. The same teacher taught both classes, using the same room and equipment and following the same program.

Although she does not present her actual data, Cannon reported the environment of the smaller class to be of much higher quality. The smaller class was characterized by a more relaxed and permissive atmosphere, more fully integrated group relationships, more positive child-teacher contacts, and more variety and creativity in play. The teacher described the smaller class as "affectionate, relaxed, and productive," perceived the children to be "more spontaneous, creative, and happy," and felt greater personal satisfaction. In contrast, the environment of the larger class was marred by greater frustra-

tion and aggression and was "less conducive to cooperative, creative play." The teacher described the larger class as "hard, noisy, and chaotic" and felt herself exhausted at the end of the day.

These studies, together with others of similar findings, provide some support for most of McKenna and Olson's conclusions favoring smaller classes. The studies suggest that smaller size promotes more individualization, more variety and creativity in classroom activities, improved teacher morale, and, generally, more positive classroom climate and social interaction.

But such effects are not always strong or uniform and depend on the teacher's ability to adapt his or her practices to smaller size. And a few studies find no significant process advantages for smaller classes. Among these studies is Haberman and Larson's. The researchers compared the classroom practices of the same seventy-nine teachers in small summer program classes of under fifteen students and in regular fall classes of twenty-two to thirty-four students. The teachers were free to teach what they wanted in the summer, but followed the prescribed curriculum in the fall. All classes were at the elementary level.

The authors used brief observations to note the type of classroom activity—teacher speaking, pupil speaking, or silence—and the number of simultaneous activities. They found that while smaller classes did bring more pupil participation and greater use of simultaneous activities, both class sizes were characterized by a single activity, namely, the teacher speaking or monitoring silence. They concluded that teachers seemingly "prefer covering material with total groups to getting involved with individuals" and concurred with McKenna and Pugh that teachers might benefit from instruction in "how to teach a small class in different ways."

In a British study, Oakley examined the influence of class size variations on teacher behavior, observing six team teachers who together taught 120 elementary students. Class size varied from under ten to over one hundred students according to the team's planning. Oakley did not publish his

actual data, but reported that size variations failed to produce "dramatic changes" in teacher behavior and that the subject taught could affect behavior as much as size. He concluded that "teacher inclination, the teacher's own style, is by far the most important determinant of what occurs in the classroom."

More recently, Yeany studied the science teaching strategies of sixty-four student teachers at the elementary level, anticipating that student teachers would make greater use of indirect behaviors, such as teacher question, response, and guidance, in classes of smaller size and higher student ability. He found, however, no significant correlations between strategy and size or class ability and suggested that the reason may have been his subjects' lack of experience.

Such findings of no class-size effect need not cancel out the findings supporting smaller classes, especially when the benefits noted are accepted as general and not absolute effects. Also, in view of Richman's findings, which reveal that teachers can be slow in changing their practices to suit changes in class size, expecially without supervisory help, the findings of Haberman and Larson and Yeany may be open to question. These studies examined the practices of teachers newly introduced to smaller classes and thus failed to give them sufficient time to adjust their practices. Their findings may then only corroborate those of Richman, showing that teachers do not quickly adjust to new learning environments. Oakley's study gives further support to the belief that the teacher's style may be the most important factor influencing process.

The safest conclusion, then, is that class size operates as a mediating or contributing factor and is not by itself a sufficient, or even necessary, condition for desirable process. Smaller size certainly eases classroom management problems and permits teachers to be more creative and give more individual attention to students, but teachers do not always make quick or full use of the opportunities provided. Teacher style and other factors greatly contribute to the quality of educational process.

CLASS SIZE AND ACHIEVEMENT

Class size appears to have little or no influence on student achievement. The research counters the expectations raised by the process studies and shows no uniform relationship between class size and achievement. Some studies favor smaller classes, some larger, and others find no significant difference. Most reviewers agree that the findings remain inconclusive, and some go on to argue that class size has no real impact on achievement. But because of the imprecision of the research, the inconsistency need not preclude some relationship.

A Relationship with Many Qualifications

Although inconclusive and unreliable, the research findings are open to some explanation. They do suggest that a class size-achievement relationship may vary according to certain situations. Ryan and Greenfield, seeking trends among the findings, tentatively conclude that smaller size may have a beneficial cumulative effect at the elementary level, but likely has no effect at the secondary level. They believe that individualization of instruction, practiced most by elementary teachers, may explain the difference.

Ryan and Greenfield also note two trends that qualify their judgment about class size at the secondary level. First, the benefits discovered for smaller English classes at this level apply most often to low-ability students. This finding gives some support to the belief that class size can affect different types of students in different ways. Second, special organizational and staffing arrangements for English and mathematics classes, the most often studied, may be counteracting the presumed drawbacks of larger classes in many studies. These arrangements have included team teaching, selected student ability groupings, and the use of aides, small group sessions, and independent study.

The idea of a cumulative class size effect at the elemen-

tary level suggests Lindbloom's explanation of the mixed research findings. Using Richman's findings for evidence, Lindbloom argues that many studies may have failed to find a class size effect because they measured only short-term gains for newly established experimental and control classes. This practice would not give teachers the time necessary to adjust their behavior to improve learning. The longitudinal studies by Balow and Furno and Collins, he concludes, allowed time for teacher adjustment and thus deserve special attention.

Balow reported a three-year experimental study comparing the reading achievement of first- through third-grade students in classes averaging thirty and fifteen students. Twenty-one schools of the Riverside Unified School District, California, participated in the study by adjusting their school day to cut class size in half for reading instruction.

Balow's findings support smaller classes with some qualifications. Their interpretation can be difficult because students participated in the program for different periods and because Balow used different controls to measure student growth. In brief, he found that first graders in the program scored significantly higher, as did second graders who began the program in the first grade. Third graders in the program showed significantly greater gains when he controlled for reading readiness and ability, but not when he controlled for prior achievement.

These findings, Balow concluded, suggest a cumulative influence for the program's smaller classes. They also suggest that the first grade is the critical year for reading and that achievement patterns may become stabilized and less susceptible to class-size influences by the middle of the third grade. Commenting on this study, Acland notes that it evidences a finding of critical period rather than one of cumulative effect. Variations in first-grade class size, he states, seem to have produced long-term benefits, but variations in size at later grades seem to have had little effect.

In a well-respected longitudinal study, Furno and Collins examined the reading and mathematics achievement of 16,449 Baltimore third graders over their next five years. The authors

compared the students' achievement according to their overall median class sizes, grouped into size ranges of under twenty-six, twenty-six to thirty-one, thirty-two to thirty-seven, and over thirty-seven students. They employed numerous controls, including race, intelligence, and parental occupation.

Furno and Collins found that students in smaller classes made significantly greater gains in both reading and mathematics. The benefit of smaller size appeared strongest in comparisons of classes of under twenty-six students with all larger classes. Of 192 statistical comparisons made, 117 favored the smaller, 16 the larger, and 57 showed no significant difference. But as Murphy points out, the support for smaller size was less conclusive in comparisons of classes of under twenty-six with classes of twenty-six to thirty-one. For these ranges, he suggests smaller classes help low-ability students the most.

A recent longitudinal study also supports smaller classes as it reveals the apparent complexity of the class size-achievement relationship. Studying the progress of 1,896 students in 150 Philadelphia schools over three years, Summers and Wolfe found that class size, as well as school size, teacher experience, and teacher's educational background, significantly influenced achievement growth. They also found that these resource factors affected different types of students in different, and sometimes contradictory, ways.

They reported these findings, warning that they are not definitive: (1) at the elementary level, classes of under twenty-eight aided low-achieving students, and classes of over thirty-three appeared to hinder the growth of all students; (2) at the junior high level, classes of over thirty-two hindered growth, hurting low-income students the most; and (3) at the senior high level, English classes of under twenty-seven aided growth, benefiting low-ability students the most. The authors speculated that teachers' negative reaction to larger classes over the contracted size limit may have contributed to the elementary level results.

The study also reported the curious finding that at one level additional library books depressed achievement growth. Such a conclusion exemplifies the problem of seeking cause

and effect in statistically identified relationships.

An experimental study by Flinker illustrates how variations in classroom organization and staffing complicate the discussion of class size. Flinker compared the achievement growth of students in one large class of fifty-five students and two smaller classes of thirty-four for seventh-grade English and mathematics. The large classes were taught by department chairmen with the help of a clerical aide. The students in the large class, Flinker found, made greater achievement gains. He concluded that despite common claims, class size does not seem to affect instruction and that consequently schools can better spend their money on support staff and services than on smaller classes.

This study demands careful interpretation, not only because it employed a short time frame and a rather large smaller-class size, but also because it examined class size under two different contexts. Clearly, the use of the aide and likely differences in teacher quality may have influenced the results. But while it changes the issue of class size, this study and many like it show that other factors can influence achievement more than class size does and that larger classes can be effective, particularly when they benefit from compensatory arrangements.

A Look at Related School Effects Research

A discussion of the class size-achievement research must also consider issues raised by more general school-effects research. The latter similarly reaches inconclusive and negative findings and suggests that no school resources or policies have much impact on achievement. Such problematic findings complicate our response to the class size findings.

A summary look at two major works will illustrate the negative findings of the school-effects research. In the much discussed nationwide study, *Equality of Educational Opportunity*, Coleman and others emphasized the dominant importance of students' socioeconomic background, concluding that "schools bring little influence to bear on a child's achievement that is independent of his background and gen-

eral social context." Of all the school factors, teacher quality, they found, exerted the most impact on achievement. Variations in school facilities and curriculums accounted for very little variation in achievement. Pupil-teacher ratios, in particular, showed "a consistent lack of relation to achievement among all groups under all conditions."

Based on past studies and their own research, Jencks and others similarly found that "variations in what children learn in school depend largely on variations in what they bring to school, not on variations in what schools offer them." They drew two general conclusions about the research evidence on school effects. First, "no measurable school resource or policy shows a consistent relationship to schools' effectiveness in boosting student achievement." The school resources that appear to have some influence change with survey, method of analysis, type of student, and type of school. And second, "the gains associated with any given resource are almost always small."

Such findings naturally suggest that educators can do very little to improve student learning and that consequently questions of class size effect are rather pointless.

Educators can respond, however, by accepting the conclusion of Jencks and others that the most important consideration is the internal life of schools, which is more responsive to variations in resources and policies. Better playgrounds, more competent teachers, smaller classes, and many other things can be justified, they argue, because they contribute to the quality of the educational experience itself.

But then, it may be that the problem lies as much in the research itself as in the apparent weakness of the school variables. The great distance between this large-scale school-effects research and its actual subject magnifies, if anything, the problems that undermine the research on class size. Most simply put, as Greenfield and Cohn and others discuss, such production-model research cannot adequately identify or measure all the important variables in operation. It also cannot explain how the variables operate together to influence achievement and other outcomes. According to Greenfield,

such research necessarily brings findings that are "highly equivocal and open to starkly contradictory explanations."

The resolution may lie in the growing sophistication of the research, as Cohn and others suggest. Some studies, the Summers and Wolfe study being one of them, have at least drawn more positive, if not definitive, findings.

Another study supporting the importance of school resources is that by Bidwell and Kasarda. The authors used data from 104 Colorado school districts for the year 1969-1970 to explore the way in which school organizational factors intervene between environmental influences and student achievement. When first examining the relative effects of the organizational factors, they found that higher districtwide achievement was strongly associated with lower pupil-teacher ratios and lower ratios of administrators to teachers, less strongly associated with higher staff qualifications, and only marginally associated with higher ratios of professional support staff to teachers.

Most importantly, the authors' analysis of the actual contributions of the environmental and organizational factors supported their hypothesis that environmental conditions affect achievement "primarily through their effects on the structure and staff composition"of school districts. They concluded that their work, though only preliminary, reaffirms the importance of school district revenue and "well-qualified teachers in large relative numbers."

DISCUSSION AND SPECULATION

Taken as a whole, the research on class size permits only tentative conclusions. Smaller class size seems to encourage more desirable educational process, most strongly so at the elementary level. Class size seems to have little impact on achievement, though the research suggests a possible cumulative benefit from smaller classes at the elementary level, most likely because of the improved process evidenced at this level. Smaller size may also be of special help to low-ability students.

Ryan and Greenfield, as they emphasize the inadequacy of the research, conclude that we do not know the answers and cannot know quickly:

> *We can conceive of no research study or group of studies which will immediately and unambiguously resolve the question of how many children should be placed in a classroom and how many people of what kinds should be responsible for helping them to learn there effectively.*

But lacking certain knowledge, we can draw some inferences and entertain some speculations. Erickson, for one, argues convincingly that the contradictory research results mean that class size exerts no powerful influence, since a powerful influence would reveal itself even with crude research procedures. The discovery of a subtle, and perhaps important, effect, however, requires greater precision than has so far been applied.

Several educators have speculated on the affective influence of class size. Wolfe, for instance, argues that class size strongly influences the intensity of instruction a student receives, which is a major determinant of learning. Smaller class size, he writes, reduces the sharing of instruction in a classroom and thus increases its intensity.

Class size is important to Cohen because it determines how well teachers can meet the dependency needs of students, needs that diminish as the students mature. Young children, she states, are emotionally and intellectually depen-

dent on the teacher, as well as dependent on the concrete and sensory, and thus require the extra attention made possible by smaller classes. As children mature, they become less dependent on the teacher and more able to assimilate new and verbally presented material in larger classes and on their own.

Bereiter believes smaller class size can benefit the personal development and emotional well-being of students by avoiding the alienation and stress produced by larger groups. For David, the issue of class size, as well as school and district size, may be more one of alienation than one of best educational practice. The debate over size, she concludes, "is about a perceived problem of advanced industrial society—the scale of units in relation to the wider environment. It addresses the question of establishing a personal identity in an increasingly anonymous society." This concern with identity and alienation may help explain the widespread faith in smaller class size, a faith not easily affected by the research results.

Bereiter also notes that class size discussions raise two distinct, but often confused questions: "Does class size make a difference?" and "*Can* class size make a difference?" The first is a question of effect under normal circumstances and typical variations. Although its problems make an answer difficult, the research generally indicates that class size has no powerful effect. The second, a question of potential effect, remains open and generates the many claims made for smaller class benefits.

The qualified negative answer to the first question, Pidgeon believes, may be explained by the widespread use of traditional mass teaching methods, which seem to be equally effective for different class sizes. Teachers have continued to use traditional methods and in general failed to take advantage of the opportunities provided by smaller classes. Even when they have done so, they have not changed their attitudes and expectations for smaller classes. Bereiter similarly argues that the failure of teachers to raise their expectations for smaller classes limits their practice of individualization and consequently depresses achievement.

The realization of significant benefits from small classes,

both Acland and Bereiter speculate, might require very small classes. Acland, who is concerned with the immediacy of student-teacher interaction, believes reduced size might show a difference at about the twelve to sixteen student size. "Above this level," he explains, "a single teacher cannot keep track of students' moment-to-moment needs."

For Bereiter, an even more drastic cut is necessary if small classes are to make a true difference by permitting learning activities and methods not possible in regular classes. The only such practices seem to be the Socratic method and the use of team projects that involve all students. Such "radically different forms of education," he concludes, require groups reduced to about ten, "the maximum size of a cohesive working group."

The inconclusiveness and variation in research findings also strengthen the conclusion that there can be no single best class size. All reviewers agree that context is more important than absolute number. David argues that size remains "a mediating variable between purposes and effects of education" and that consequently "size cannot be divorced from context." The question of best size, as Ross and McKenna conclude, must be stated, "Class size for what end and under what circumstances?"

The appropriate size for any class will thus depend on many matters of context, most notably on educational goal and instructional strategy. For Pidgeon, small classes are justified only when educators accept the presupposition that learning is more important than teaching and accordingly employ methods that increase student-teacher interaction. Appropriate size will also depend on staffing arrangement and classroom organization, teacher workload, teacher style, subject, grade level, student ability and homogeneity, and the relationship of the classroom to the total school organization.

Class size policies, according to Smith and McCluskey (1976), must follow from considerations of, first, instructional goals and strategies, and, second, appropriate school staffing arrangements. Like Cohen, they believe goals and staffing should accord with student age. Early primary child-

ren could benefit from strategies of intensive interaction and a school organization of small self-contained classes with aides. Young adolescents, "developing independence within a peer group context," could benefit from different strategies, which include the use of reports and projects, and a different school organization, one of coordinated teams.

A variety of class sizes suited to context, as Holland and Galfo argue, may best serve the many goals of education and the different intellectual and affective needs of students. "The best hope for the future," they conclude, "is to provide students with opportunities to learn in both large and small groups, the selection of group size being determined by the teaching objectives."

ISSUES OF CLASS SIZE POLICY

The class size research leaves educators without clearly established knowledge or specific guidelines for setting class size policies. As always, policy-makers will have to balance the conflicting demands of educational quality and economics. This task is the more difficult because a reduction in class size is only one of many means of improving quality and because smaller classes by themselves cannot guarantee higher quality.

The task is also complicated by recent social, economic, and political pressures, which, as Smith and McCluskey (1975) argue, alter the "socio-political meaning of class size." A class size policy must take into account the impact of declining enrollments and collective negotiations.

Class Size and Declining Enrollments

The class size issue has received the most interest in times of rapidly rising enrollments when schools struggled with space and teacher shortages and the reality of overcrowding. As Smith and McCluskey write, the primary concern of schools in the fifties and sixties was that of providing enough classrooms for their new students. Finding enough teachers to staff them was only a secondary concern.

Under the present conditions of enrollment decline, many schools enjoy abundant space and staff and no longer have to struggle with expansion. Educators argue that schools can now take advantage of the decline and improve the quality of their education, lowering pupil-staff ratios and reducing class size.

This opportunity may prove illusory, however, because schools also face new problems of contraction. Rising costs and declining revenues, conjoined with declining enrollments, are creating severe economic problems, sometimes forcing staff reductions and school closures. Improvements in quality,

or even the maintenance of current programs, may not be possible. In sum, "Educators have an unparalleled chance today," Smith and McCluskey write, "to decrease class size as student enrollment continues to decline, but they must spend scarce, inflated dollars in order to do so."

How have schools responded to the decline? Odden and others found in their study of four states that the decline has brought increased spending and decreased pupil-teacher ratios. The instructional and administrative expenditures of districts whose enrollment had declined were in general 20 percent or more above statewide averages. The pupil-teacher ratios of these districts were lower and had decreased more since 1970 than those of other districts. But they also noted that expenditure and staff cuts must necessarily lag somewhat behind enrollment declines and concluded that their findings may reflect only "a short-run phenomenon" and not "a permanent increase in the quality of the educational program."

If the present trend is one of decreasing ratios, it is a continuation of progressive decreases that have occurred during the past several decades. Golladay reports that between the years 1955 to 1974 pupil-teacher ratios declined from 30.2 to 22.7 at the elementary level and from 20.9 to 18.7 at the secondary level. For 1978, Golladay projects lower ratios of 21.5 at the elementary level and 18.1 at the secondary level. Schools, then, have maintained a commitment to lower pupil-teacher ratios and reduced class size, despite little encouragement from the research, in times of both rising and declining enrollments.

This gradual decline in class size, it should be noted, has been accompanied by corresponding changes in perceptions of the optimum class size. Fleming writes that in 1929, when most classes had over forty students, teachers favored classes of not more than thirty-five or forty. Ten years later, teachers desired classes of about thirty. By 1949, when classes averaged nearer to thirty, teachers set the ideal size at twenty-five. More recently, National Education Association Executive Director Terry Herndon, cited in Payne's "Four Teachers Sound Off about Class Size," has set the ideal size still lower,

at eighteen to twenty-two students for elementary classes. A possible explanation for these changes in perception may lie in the changes in teaching methods and conceptions of teacher roles and responsibilities.

Class Size and Collective Negotiations

The political process of collective negotiations also complicates class size decision-making. Some educators, such as Williams, question whether educational or political reasons determine class size decisions. Since the research provides no clear answers, class size decisions, Williams suggests, become less the result of "a rational decision-making process, based upon accepted empirical facts," than "the political result of bargaining among vested interest groups."

The debate between teachers and administrators, Acland adds, involves several different issues. Teachers favor class size reductions, he states, because they believe smaller classes bring a lightened workload, make teaching easier and more effective, and bring greater student achievement. In contrast, administrators favor larger classes because of budget constraints and argue that small increases in size will not noticeably increase workload or impair teaching practices or achievement.

A study by Hall and Carroll surprisingly suggests that the bargaining process can bring increased class size. Using data from 118 school districts in suburban Cook County, Illinois, for the year 1968-1969, the authors found that teacher unions were accepting larger classes concurrently with higher salaries. The causal connection between the increases in class size and salaries was not clear. The authors remained uncertain whether larger classes were leading to demands for higher salaries or whether higher salaries were forcing boards with limited budgets to increase class size.

In a theoretical paper, Reed expects that bargaining will bring a progressive and self-feeding trade-off of larger classes for higher salaries, a trade-off that will undermine the quality of education. Teacher unions, he argues, will by their very nature press for higher salaries above all, and schools with

limited resources will necessarily respond by increasing pupil-teacher ratios and decreasing instructional support expenses. These responses will decrease teacher satisfaction and engagement in their work, which depend to a large extent on close relations with students. As teachers experience less satisfaction, they will seek escape from their work and press for reduced contacts with students and still higher salaries. And as teacher involvement with their work decreases, Reed concludes, so will student achievement.

A recent study by Flango, however, draws more positive conclusions. Examining the impact of collective negotiations nationwide on a state-by-state basis, Flango found no evidence of a trade-off of larger classes for higher salaries. In fact, he concluded that the sole effect of collective negotiations has been a decrease in pupil-teacher ratios at the elementary level.

General Guidelines for Class Size Policy

The sociopolitical complications of class size can make policy decisions difficult. But the general policy guidelines of Ross and McKenna, which favor smaller class size with appropriate caution and flexibility, offer educators some commonsense help. Although written over twenty years ago in times of rising enrollments, their guidelines continue to receive support in the literature.

First, as Ross and McKenna advise, policy-makers should consider smaller classes only one of many desired conditions and not "rob all other items of the budget" to pay for them. When considering staffing needs, schools should pay attention to their total staffing organization and not view class size problems in isolation. For Ross and McKenna, numerical staff adequacy, the number of all professional staff per 1,000 students, acts as a better predictor of educational quality than does class size. The Bidwell and Kasarda study questions this contention, however, and Stemnock adds that "no model for school staffing has received general acceptance."

Second, Ross and McKenna warn against overemphasizing uniformity in developing class size policies. There is no one best class size, as all writers concur; class size should conse-

quently accord with instructional goal and other matters of context. The Oregon State Department of Education's new *Elementary-Secondary Guide*, acknowledging this consensus, requires districts to establish class sizes "at all grade levels and in all instructional areas considering curriculum content, instructional method, needs of students, and expected learning outcomes."

Third, the authors call for "more imagination and experimentation in school organization and building utilization." Twenty years ago experimentation was needed as a response to overcrowding. Today, active experimentation is still a means of achieving potential benefits even in the midst of enrollment decline. The uncertainty about class size effects and the complex issues class size raises invite exploration, both in manipulating size to fit context and in using different staffing arrangements.

Suggestions for experimentation can be quite radical. Bereiter, for instance, notes that drastically reduced class size could be achieved without undue expense by shortening the students' school day. He suggests that at the elementary level, two hours a day in classes of ten, along with additional supervised activities, could bring more effective education than the present system, provided teaching methods were appropriately changed.

Fourth, Ross and McKenna advise administrators to help teachers adjust their methods to suit class size, both to take advantage of smaller size and to minimize the problems presented by larger size. The evidence clearly reveals that teachers often fail to adapt fully to their teaching environment. Richman's study indicates that their adaptation can be encouraged by supervision. Some educators believe supervision may not be enough, however. Pidgeon argues that if teachers are to realize the potential of small classes, they will need training in the use of student-centered methods, and their training will need to be joined with changes in their "attitudes and beliefs about the purposes of the educative process."

Finally, Ross and McKenna extend a word of caution. Present-day policies, they warn, can set a tradition that could

in the future limit flexibility. Murphy draws Machiavellian advice from this suggestion. School boards, he writes, should avoid including any statement on class size in written contracts in order to preserve maximum flexibility.

Some Practical Suggestions

A recent *Education U.S.A.* article, "Weighted Pupil Plan Solving Class Size Issue," illustrates some more specific and practical solutions to policy problems. The article reports on the favorably received class size policies of the Denver Public Schools, similar to those negotiated by the Lodi Education Association, California.

The Denver schools compute class size by means of a differential formula that reflects the different demands students make on teachers. According to the district's weighted formula, each gifted or bilingual student may be counted as 1.5 regular students, learning disabled student as 2.0 students, and hyperactive or emotionally disturbed student as 2.5 students. The actual weightings are arbitrary, but the formula offers a workable means of adapting class size to suit student characteristics. It may be of special help in minimizing problems of mainstreaming handicapped students.

The Denver policies not only redefine class size practically, but also provide direct help to overburdened teachers. The negotiated contract redirects 20 percent of a desired salary raise to class size and workload relief, funding teacher aides, part-time substitutes, and reading specialists. A district committee of five teachers and five administrators acts on individual requests for relief, which are assembled and forwarded by school-level class size committees.

The weighted formula should objectify complaints about class size and workload and thus help the committee determine where help is most needed. These Denver policies suggest some creative means of resolving class size problems– means that hold the promise of replacing an adversary teacher-administrator relationship with one of collaboration.

CONCLUSION

In sum, the problematic research on class size raises the questions of what we can know and how we can know. Fraught with problems of definition, measurement, and quality, the research offers little sure and undisputed knowledge and little likelihood of a quick resolution. It says with certainty only that the teaching-learning process is complicated and affected by many variables and that class size has little powerful and uniform effect by itself.

In the face of such conclusions, educators will have to fall back on common sense and experience and the general trends presented by the research evidence. Smaller size, it appears, contributes to desirable process, though its full impact on process demands the use of student-centered teaching methods. These process benefits have not yet generally been proved to result in greater student achievement. Larger classes can be as effective as smaller classes, especially when compensatory arrangements are made. Variations in class size seem to have the most impact at the elementary level.

Smaller classes remain desirable for quality education and are widely valued, but they offer no guarantees. Policy-makers can best respond with a class size policy of flexibility, one that adjusts size to the particular ends and circumstances of individual classes. While educators await more definitive research, administrators and teachers can best solve their differences over class size through mutual compromise and creative collaboration.

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Interview

Hall, Leland (Member, board of directors, Oregon Education Association; past president, Bethel Education Association). Interview, November 23, 1977.